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FEB 2 2001

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

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February 2, 2001

Ms. Magalie Roman Salas  
Secretary, Federal Communications Commission  
445 12<sup>th</sup> Street, S.W.  
Washington, DC 20554

Re: *Deployment of Wireline Services Offering Advanced Telecommunications Capability and Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*,  
CC Docket No. 98-147 and CC Docket No. 96-98

Ex parte presentation pursuant to C.F.R. §1.1206

Dear Ms. Salas:

Catena Networks, Inc. ("Catena") met yesterday with Commissioner Ness and David Goodfriend of her staff. During the meeting, Jim Hjartarson and Doug Cooper discussed Catena's integrated approach to providing broadband services by combining voice service (plain old telephone service, or "POTS") and ADSL functionality on linecards. In particular, the discussion covered the company's goal of making broadband widely available and affordable to Americans that otherwise may not be served using an overlay method of DSL deployment. This discussion concentrated on the engineering concepts behind integrated solutions, similar to that explained by company representatives at the COMNET Conference and Expo, held open to the public January 30 to February 1, 2001, at the Washington, D.C. Convention Center. In addition, the discussion turned to possible network configuration models using existing "softswitch" technologies. Also provided during the discussion were a press kit containing company product brochures and press releases, copies of which are attached.

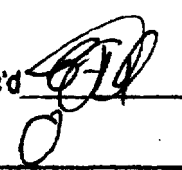
Respectfully submitted,

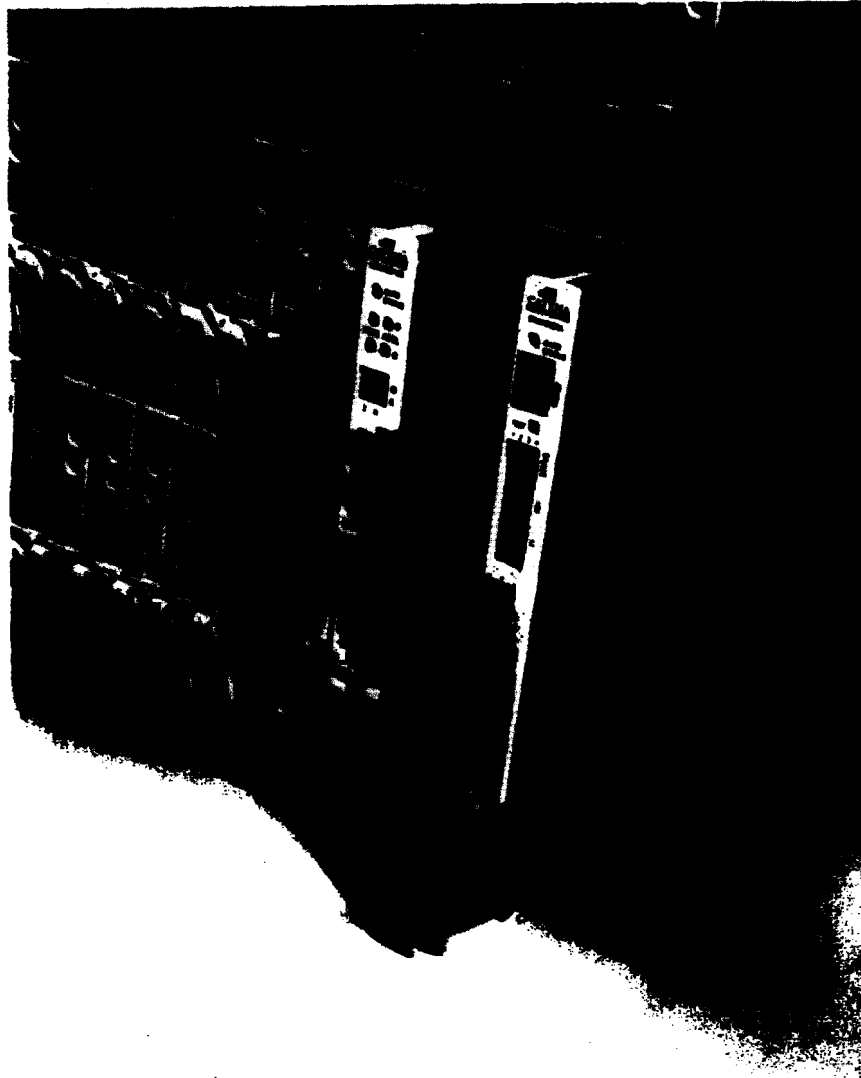


Stephen L. Goodman  
Counsel for Catena

cc: David Goodfriend

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A B C D E





**CNX-5 Broadband ADSL System**





# News Release

CATENA NETWORKS 303 Twin Dolphin Drive, Suite 600, Redwood Shores, Calif. 94065 Voice 1 866 2CATENA [www.catena.com](http://www.catena.com)

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**Catena Networks Introduces First In Series of Solutions Enabling Mass-Market DSL and Seamless Migration to Converged, Packet-Based Public Network**

*CNX-5 Broadband ADSL System Gives Carriers a Fast, Cost-Effective, Scalable Way to Upgrade Digital Loop Carrier Systems*

**WASHINGTON, D.C. – January 30, 2001** – At COMNET 2001 in booth number 4108, Catena Networks introduced the first in a series of solutions that will enable the mass-market deployment of residential DSL and provide carriers with a seamless migration path to the converged, packet-based public network.

The Catena CNX-5 ADSL system for upgrading Lucent SLC® Series 5 (SLC-5) Digital Loop Carrier (DLC) Systems enables service providers to deliver Plain Old Telephone Service (POTS) and Asymmetric Digital Subscriber Line (ADSL) services on any copper pair, without reducing the number of available POTS lines.

The CNX-5 gives carriers a fast, cost-effective and scalable way to provide revenue-generating DSL services to the more than 20 million residential subscribers served by SLC-5 remote terminals.

The exploding demand for residential broadband services has created an urgent need for service providers to deliver DSL to customers served by these remote terminals. According to the research firm Telechoice, DSL deployments are expected to grow to nearly 8 million by 2002. A recent study by the Cahners In-Stat Group found that ADSL will capture more than 70 percent of the total DSL market by 2004. Further, RHK forecasts that by 2003, more than 50 percent of target ADSL residential subscribers will be served from remote terminals.

However, current solutions for delivering DSL from remote terminals – ranging from bolt-on mini Remote Access Multiplexer (mini-RAM) systems to remote Digital Subscriber Line Access Multiplexers (DSLAMs) and adjunct cabinets – are expensive, inefficient and don't scale to support large volumes of users. These solutions require additional space in a remote terminal cabinet, or worse, an incremental investment in additional concrete pads and cabinets.

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"To establish DSL as a mass-market service for consumers, carriers need a low-cost, scalable solution that addresses last-mile bottlenecks related to remote terminals," said Patrick Hurley, DSL analyst for Telechoice. "Solutions that allow service providers to inexpensively and easily upgrade their existing DLC infrastructure, like Catena's CNX-5 system, will help facilitate large-scale deployments of DSL service."

Bob Machlin, president and chief executive officer of Catena Networks, said, "Catena's linecard integration of POTS and DSL enables broadband deployments today and facilitates a seamless, line-by-line transition to the new converged, packet-based public network of tomorrow."

The Catena CNX-5 system consists of an integrated 2 POTS and 2 DSL port channel unit, an ATM multiplexer card, and the CatenaView Element Management System (EMS), which are the only elements required to upgrade the SLC-5 to support DSL.

This simple, card-for-card upgrade eliminates the need for POTS splitters, cross-connects, external cabling, mini-RAMs, and additional pads and cabinets. In addition, service providers can expand DSL availability in two-line increments as residential demand for DSL increases.

By allowing service providers to handle all DSL service requests through remote provisioning from their network operations center via the CatenaView EMS, the CNX-5 dramatically reduces operational costs. Catena's programmable silicon technology also allows carriers to manage evolving ADSL standards by delivering new features via software downloads – not costly hardware upgrades. The CNX-5 effectively leverages carriers' investments in installed SLC-5 equipment and provides the industry's lowest capital, service activation and lifecycle cost solution.

#### **The Elements of the CNX-5 ADSL Upgrade**

The *Catena Enhanced Channel Unit* (ECU) is the linecard replacement that integrates POTS and ADSL interface technology within the existing SLC-5 chassis. For the technician, the installation of the ECU is the same as a standard SLC-5 POTS channel unit. The Catena ECU sports a red lever on the front of the unit for quickly and easily determining which lines are DSL-enabled.

To support DSL services on the SLC-5, the *Catena Enhanced Channel Test Unit* (ECTU) replaces the existing Channel Test Unit. By employing existing system resources to facilitate communications between the ECU cards and the ECTU, there is no need for external cabling, either between cards or to an external POTS splitter, thus simplifying installation.

Once installed and connected to backhaul facilities, the ECTU is ready to be provisioned for DSL services from the network operations center. The CNX-5 upgrade offers three backhaul options – T1, 4xT1 IMA, and DS-3 – that allow the carrier to start inexpensively and increase backhaul bandwidth as needed.

To provision and manage mass-market DSL services, the CNX-5 uses the *CatenaView EMS* and a complete Application Programming Interface (API) suite. Expandable to hundreds of thousands of lines, CatenaView can be distributed across client/server platforms. The API provides the interfaces necessary to electronically link the CNX-5 to upstream operation support systems and, by utilizing a TCP/IP-based protocol, enables interoperability regardless of platform, operating system, programming language, network hardware or software.

#### **Pricing and Availability**

Catena's CNX-5 is currently shipping to service providers. Pricing for the complete CNX-5 ADSL system starts at less than \$3,000. For more information on the CNX-5, contact Catena at 866-2CATENA or visit the company's web site at [www.catena.com](http://www.catena.com).

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### **About Catena Networks**

Catena Networks will enable the mass-market deployment of broadband DSL services and help carriers migrate to a converged access network that integrates their volume voice and DSL operations. With Catena's solutions, service providers can deliver integrated voice, data and video services to residential subscribers more quickly, cost effectively and profitably than ever before. Headquartered in Redwood Shores, Calif., the company operates a world-class research and development facility in Kanata, Ontario, Canada (near Ottawa) and has more than 240 employees across North America. Founded in 1998, Catena is a privately held company that has secured more than \$100 million in venture financing. For more information, please access [www.catena.com](http://www.catena.com).

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# News Release

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## **Catena Networks Creates New Access Architecture for the Mass-Market Deployment of Broadband DSL Services**

**WASHINGTON, D.C. – January 30, 2001 –** At COMNET 2001 in booth number 4108, Catena Networks today announced its development of a new access architecture, which will enable the mass-market deployment of residential Digital Subscriber Line (DSL) services. This new architecture will provide carriers with a smooth, cost-effective migration path to the converged, packet-based public network.

The exploding demand for residential broadband services has created an urgent need for service providers to deliver DSL at high volumes. According to market research firm RHK, the high-speed DSL Internet access market is expected to grow from 2.4 million subscribers today to about 19 million by the end of 2004. Still, more than 40 percent of residential subscribers are unable to get DSL because they do not meet specific connection criteria or because deployment hasn't kept pace with demand in their area.

The challenge is that today's DSL data access network is being designed as a separate overlay to the voice network. This data overlay network is satisfactory for the deployment of niche, business-oriented services, but it is not scalable for consumer mass-market deployment.

"In order to deploy mass-market DSL to residential subscribers, carriers must deliver DSL to the growing number of remote subscribers served by Digital Loop Carrier (DLC) systems," said Claude Romans, co-director of access networks for RHK. "Catena has developed an architecture that terminates the loop at the first access point and has the potential to offer carriers a way to deliver high volume voice and DSL services to remote subscribers."

For carriers to successfully deploy mass-market DSL, a fundamental change in the access network is required. A new, converged access architecture is needed to overcome last-mile barriers to DSL service for residential subscribers. Network elements in this architecture must satisfy the escalating demand for DSL service and handle growing numbers of users served from existing and future remote terminals.

Catena's solutions will enable mass-market deployment of DSL and access network convergence by integrating POTS (Plain Old Telephone Service) and DSL on every line.

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"Unlike other solutions that attempt to combine POTS and DSL, Catena's solutions integrate POTS and DSL into a single access termination point," said Bob Machlin, president and CEO of Catena Networks. "This level of integration enables us to create an architecture that will simplify the access network, solve deployment bottlenecks and dramatically reduce carriers' capital and operational costs."

Catena's converged access architecture will significantly reduce the capital and operational costs of deploying DSL service by providing DSL on every line, at prices approaching POTS-only solutions. Every subscriber line will support lifeline telephone service and will be "DSL ready" the moment it is installed, which means that service providers can scale service rapidly, without additional capital costs, as their DSL demand grows.

All operations, provisioning and maintenance can be performed remotely. All DSL service requests will be handled through completely hands-off remote provisioning from the network operations center. No truck rolls will be required.

Catena's highly integrated POTS+DSL architecture will eliminate the need for separate, overlay access equipment such as POTS Splitters, remote DSLAMs and adjunct cabinets. This converged access network will significantly reduce complexity and points of failure, resulting in greater network reliability.

Service providers will have full spectrum connectivity to the subscriber loop, which will greatly simplify testing and loop qualification and enable future services such as higher-bandwidth ADSL (Asymmetric Digital Subscriber Line). Further, Catena's architecture supports optional voice packetization, on a per-line basis, at the line termination point. There will be no forced trade-off of packet voice ports for DSL ports.

Catena's new access architecture will enable service providers to deliver broadband services today and seamlessly transition to the new, converged packet-based public network on a line-by-line basis – with the network architect in control of the where and when of implementation.

The first in a series of solutions in Catena's new access architecture is the CNX-5 broadband ADSL system. (See accompanying release, "Catena Networks Introduces First in Series of Solutions Enabling Mass-Market DSL and Seamless Migration to Converged, Packet-Based Public Network.") Catena's CNX-5 is a card-for-card upgrade for the more than 20 million subscriber lines currently served from Lucent SLC® Series 5 (SLC-5) DLC systems. Catena's CNX-5 broadband ADSL system enables service providers to deliver POTS and ADSL services on any copper pair, without reducing the number of available POTS lines.

#### **About Catena Networks**

Catena Networks will enable the mass-market deployment of broadband DSL services and help carriers migrate to a converged access network that integrates their volume voice and DSL operations. With Catena's solutions, service providers can deliver integrated voice, data and video services to residential subscribers more quickly, cost-effectively and profitably than ever before. Headquartered in Redwood Shores, Calif., the company operates a world-class research and development facility in Kanata, Ontario, Canada (near Ottawa) and has more than 240 employees across North America. Founded in 1998, Catena is a privately held company that has secured more than \$100 million in venture financing. For more information, please access [www.catena.com](http://www.catena.com).

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# News Release

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## **Catena Networks Confirms Interoperability with Major DSL CPE Vendors**

**WASHINGTON, D.C. – January 30, 2001** – Catena Networks today announced that its CNX-5 broadband ADSL system is fully interoperable with all of the leading providers of DSL customer premises equipment (CPE) and silicon. In booth number 4108 at COMNET 2001, the company will demonstrate the CNX-5 system functioning seamlessly with DSL modems from Alcatel, Cayman Systems, Efficient Networks, and Infinilink Corp.

Catena successfully tested interoperability with these and a host of other leading DSL CPE vendors at its interoperability lab in Kanata, Ontario, Canada, and at an independent testing lab. The Catena CNX-5 ADSL system is fully compliant with the ANSI T1.413, ITU-T G.992.1 (G.dmt), ITU-T G.992.2 (G.lite) and ITU-T G.994.1 (G.handshake) DSL standards.

"Catena Networks is truly enabling the volume deployment of DSL with its interoperability efforts and standards-based system," said Greg Whelan, director of product marketing for Cayman Systems, Inc. "The synergy between Catena's CNX-5 and Cayman's intelligent broadband gateways provides a compelling, high-speed access solution for the residential subscribers."

"Working with a company such as Catena promotes Efficient's goal of accelerating the adoption and deployment of DSL service to consumers," said Greg Langdon, executive vice president of product strategy for Efficient Networks. "Catena's solutions are paving the way for volume penetration of broadband to the home."

The growing demand for residential broadband services has created an urgent need for service providers to deliver DSL to customers served by remote terminals. Catena's CNX-5 system gives carriers a fast, cost-effective and scalable way to provide revenue-generating DSL services to the more than 20 million residential subscribers served by Lucent SLC® Series 5 (SLC-5) Digital Loop Carrier (DLC) Systems. (See accompanying release, "Catena Networks Introduces First in Series of Solutions Enabling Mass-Market DSL and Seamless Migration to Converged, Packet-Based Public Network.")

"Catena Networks is creating a new access architecture, which we believe will help enable the mass-market deployment of residential DSL service," said Michael Howard, principal analyst for Infonetics Research. "Given the slow rollout rates caused by limitations in the current generation of DSL equipment, a leapfrog approach, such as Catena's, is needed to jump start the broadband bandwagon – a move necessary to make DSL as ubiquitous as POTS."

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Catena's new access architecture is designed to enable mass-market deployment of DSL and access network convergence by integrating POTS (Plain Old Telephone Service) and DSL on every line. Solutions based on this architecture, such as the CNX-5 Broadband ADSL system, also provide carriers with a smooth, cost-effective migration path to the converged, packet-based public network.

The CNX-5 system is fully interoperable with more than 20 DSL CPE and chipset vendors, including: Alcatel, Analog Devices, Aztech Systems, Cayman Systems, Centillium Communications, Cisco Systems, Conexant Systems, Efficient Networks, GlobeSpan, Infinilink Corp., Integrated Telecom Express (ITeX), Lectron, Lucent Technologies, Motorola, PCTEL, Ramp Networks, STMicroelectronics, Texas Instruments, Westell Technologies and ZyXEL.

#### **About Catena Networks**

Catena Networks will enable the mass-market deployment of broadband DSL services and help carriers migrate to a converged access network that integrates their volume voice and DSL operations. With Catena's solutions, service providers can deliver integrated voice, data and video services to residential subscribers more quickly, cost-effectively and profitably than ever before. Headquartered in Redwood Shores, Calif., the company operates a world-class research and development facility in Kanata, Ontario, Canada (near Ottawa) and has more than 240 employees across North America. Founded in 1998, Catena is a privately held company that has secured more than \$100 million in venture financing. For more information, please access [www.catena.com](http://www.catena.com).

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# Everyone wants **Broadband**

Catena Profile

Revolutionizing the Delivery of  
High-Speed Voice, Data and Video  
Services to the Mass Market





Everyone wants Broadband

## Now, everyone can get it.

Catena Networks has developed groundbreaking solutions that integrate broadband Digital Subscriber Line (DSL) capability with Plain Old Telephone Service (POTS) on standard twisted-pair copper wiring, at costs approaching POTS-only solutions.

These solutions will enable the mass-market deployment of DSL and help carriers migrate to a converged, packet-based network that integrates their volume voice and DSL operations.

Catena Networks' solutions enable service providers to simplify the access network, solve deployment bottlenecks and dramatically reduce their capital and operational costs.

## The DSL Market

DSL deployments are expected to increase to nearly 8 million lines by the year 2002, according to Telechoice, an industry research firm. Market research firm RHK predicts that the DSL market will grow 128% per year through the year 2003. Further, RHK forecasts that more than 50% of residential subscribers will be served from remote terminals in three years.

Currently, 30% of subscribers are served by remote terminals, with more than 20 million residential subscribers connected to Lucent SLC® Series 5 (SLC-5) Digital Loop Carrier (DLC) Systems.

## The Challenge for Service Providers

Despite the unprecedented demand for residential broadband services, more than 40% of residential subscribers are unable to get DSL because they do not meet specific connection criteria or because deployment hasn't kept pace with demand in their area.

The challenge is that today's DSL data access network is being designed as a separate overlay to the voice network. This data overlay network is satisfactory for the deployment of niche, business-oriented services, but it is not scalable for price-sensitive consumer mass-market deployment.

For carriers to successfully deploy mass-market DSL, a fundamental simplification in the access network is required. Network elements in this architecture must satisfy the escalating demand for DSL service and handle growing numbers of users served from existing and future remote terminals.

Current solutions for delivering DSL from remote terminals — ranging from bolt-on mini Remote Access Multiplexer (mini-RAM) systems to remote Digital Subscriber Line Access Multiplexers (DSLAMs) and adjunct cabinets — are expensive, inefficient and don't scale to support large volumes of users. These solutions require additional space in a remote terminal cabinet, or worse, an incremental investment in additional concrete pads and cabinets. With today's overlay network, service providers also incur high operational costs. Carriers must complete expensive service visits, or truck rolls, to provision service to new customers or handle service-change requests. This hands-on modification of the access equipment can take days or weeks.

"To deploy mass-market DSL to residential subscribers, carriers must deliver DSL to the growing number of remote subscribers served by Digital Loop Carrier (DLC) systems," said Claude Romans, co-director of access networks for RHK. "Catena has developed an architecture that terminates the loop at the first access point and offers carriers a way to deliver high volume voice and DSL services to remote subscribers."

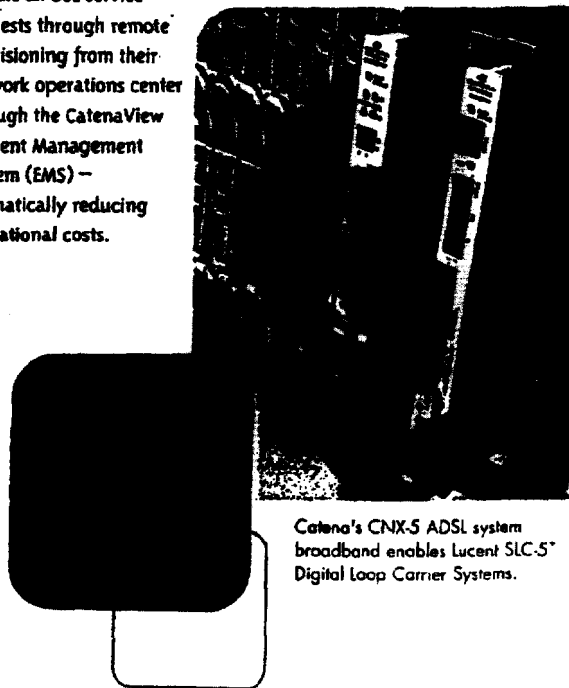
## Catena's Integrated Access Solutions

### CNX-5 Broadband ADSL System

The Catena CNX-5 is a simple, elegant and cost-effective Asymmetric Digital Subscriber Line (ADSL) system for upgrading Lucent SLC-5 Digital Loop Carrier Systems. It enables service providers to deliver POTS and ADSL services on any copper pair, without reducing the number of available POTS lines.

Installation of the CNX-5 involves little more than a simple card-for-card replacement that provides two lines of integrated POTS and ADSL.

The CNX-5 system performs all line functions associated with POTS and ADSL, as well as all multiplexing, ATM and uplink functions. It eliminates the need for POTS splitters, mini-RAMs, DSLAMs, external cabling and additional pads and cabinets. Once the CNX-5 is installed, service providers can handle all DSL service requests through remote provisioning from their network operations center through the CatenaView Element Management System (EMS) — dramatically reducing operational costs.



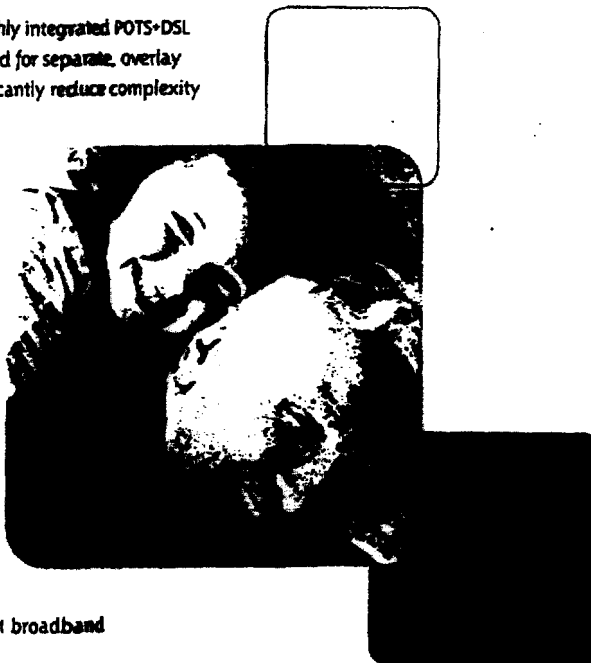
Catena's CNX-5 ADSL system broadband enables Lucent SLC-5® Digital Loop Carrier Systems.

## The World's First Broadband Loop Carrier

Catena Networks is developing a new class of access vehicle, the Broadband Loop Carrier (BLC), which will dramatically improve availability of DSL service and enable a seamless migration from today's circuit-switched network to a converged, packet-based network. With Catena's BLC, every subscriber line will support lifeline telephone service and will be "DSL ready" the moment it is installed. All operations, provisioning and maintenance can be performed remotely. No truck rolls will be required.

The Broadband Loop Carrier's highly integrated POTS+DSL architecture will eliminate the need for separate, overlay access equipment and will significantly reduce complexity and points of failure.

Service providers will have full spectrum connectivity to the subscriber loop, which will greatly simplify testing and loop qualification and enable future services such as higher-bandwidth ADSL.



## Catena Networks

"Catena" is the Latin word for "chain." Catena Networks was founded on the principle of helping service providers establish affordable and efficient broadband links to their subscribers.

Catena Networks was founded in 1998 by a seasoned team of senior executives that pioneered development of mass-market voice and data access solutions. Their solutions have been deployed in volumes exceeding 150 million lines. The company has developed more than 20 patented innovations enabling low cost, low power and high density POTS+DSL access system solutions. Catena is a privately held company, which has more than 240 employees and has secured U.S. \$105 million in venture financing. The company is headquartered in Redwood Shores, California, in the heart of Silicon Valley, and it maintains a state-of-the-art research and development center in Kanata, Ontario, Canada, near Ottawa.

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# CNX-5

## CNX-5 — SLC Series 5 DSL Upgrade System

The CNX-5 is a simple, elegant, and inexpensive Asymmetric Digital Subscriber Line (ADSL) upgrade solution for the Lucent SLC® Series 5 Carrier System. This new deployment approach enables service providers to deliver both Plain Old Telephone Services (POTS) and ADSL services on any copper pair without compromising POTS density. The CNX-5 leverages the investment in installed Digital Loop Carrier (DLC) equipment making it the most cost effective solution for delivering DSL services from the DLC. The CNX-5 upgrade is inexpensive to purchase and install, expands in two channel increments, and provides T1, rxT1, and DS-3 trunk options to leverage available backhaul bandwidth.

Based on the SLC Series 5 chassis, the CNX-5 solution consists of three components: an integrated 2 POTS and 2 DSL port channel unit, an ATM multiplexer card and the CatenaView Element Management System (EMS).

Catena Networks' CNX-5 solution is ideal for service providers to quickly respond to DSL service demand served by their installed base of SLC Series 5 remote terminals.

### CNX-5 Highlights

**Simple.** An ATM multiplexer common card and a two-line POTS/DSL channel unit card are all it takes to upgrade the SLC-5 to support DSL.

**Elegant.** The CNX-5 requires no external cabling, no "pizza boxes", no POTS splitters, and no additional pads and cabinets — just a simple card-for-card upgrade.

**Cost-effective.** Lower start costs, lower expansion costs, and lower inventory costs make the CNX-5 much less expensive than Mini-RAMs, and remote DSLAMs.

**Scalable.** The CNX-5 provides cost effective growth in two-line increments without reducing POTS port count. CatenaView EMS is expandable to tens of thousands of lines.

**Future Proof.** Catena's Programmable Full Spectrum Management silicon technology embraces ADSL standards evolution by not "stranding" spectrum behind hard-wired POTS splitters.

The CNX-5 DSL Upgrade System is applied to the installed base of SLC-5 Series 5 Digital Loop Carrier Systems. With the CNX-5 solution, the SLC Series 5 can be DSL equipped with simple card-for-card replacements — with no reduction in POTS capacity.

 **CATENA**  
NETWORKS

## The Simple, Elegant Solution for Delivering DSL from the SLC 5

### The Challenge

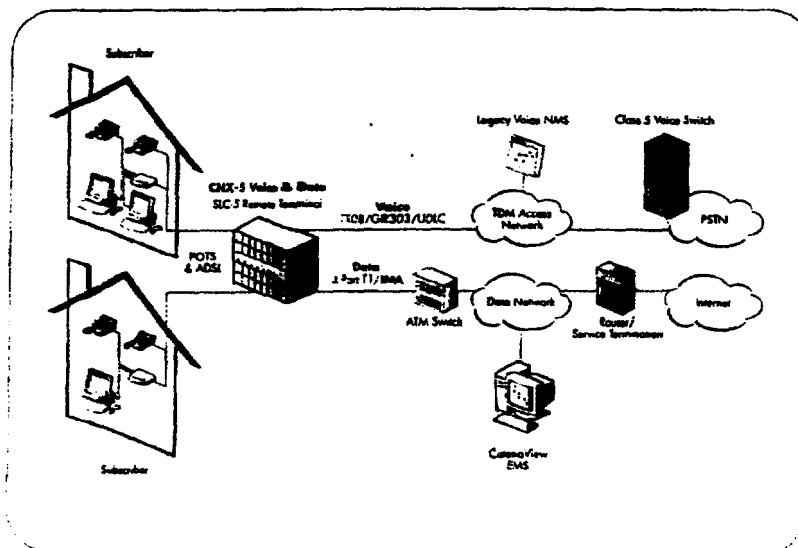
The exploding demand for residential broadband service, and rapidly expanding competition from cable providers has created an urgent need for service providers to deliver DSL to customers serviced by DLCs. However, current solutions for delivering DSL from remote terminals — ranging from remote DSLAMs to bolt-on Mini-RAM systems — are bulky, cumbersome and not cost-effective. These solutions require additional space in a remote terminal cabinet, or worse, an incremental investment in additional concrete pads and cabinets. What is needed is a solution that provides a quick, simple and reliable upgrade to the existing installed base of SLC Series 5 systems — one that is cost-effective yet provides considerable capacity for growth.

### The Catena CNX-5 Solution

To meet this need, Catena Networks introduces the CNX-5 SLC Series 5 DSL Upgrade System. It is a simple, elegant and cost-effective way to leverage an investment in SLC Series 5 DLC installations to easily introduce residential DSL. Part of its simplicity is owing to its three part make-up: an integrated 2 POTS plus 2 DSL port channel unit card, an ATM multiplexer card and the CatenaView Element Management System EMS.

### CNX-5 Within the Network

The CNX-5 is a simple card replacement ADSL upgrade solution that resides in the SLC Series 5 access platform located in a remote terminal. Standards-based and widely interoperable with all popular ADSL CPE, it provides the data transmission and voice interface between end users and the central office. Catena's CNX-5 upgrade is comprised of a common card called the Enhanced (ATM Mux) Channel Test Unit (ECTU) and the Enhanced Channel Unit (ECU). Together, these cards provide the added functionality of a DSLAM while preserving the functionality of POTS and legacy services on the SLC Series 5.



The CNX-5 Upgrade System provides a simple, elegant and cost-effective way to introduce DSL transmission to the remote SLC-5 DLC.

## Solution Elements

### Catena Enhanced (ATM Mux) Channel Test Unit (ECTU)

To support DSL services on the SLC Series 5, the existing CTU card is replaced with Catena's single common ECTU card. While the ECTU retains the legacy CTU functionality, it also provides the DSLAM functionality in the SLC-5. The CNX-5 utilizes existing system



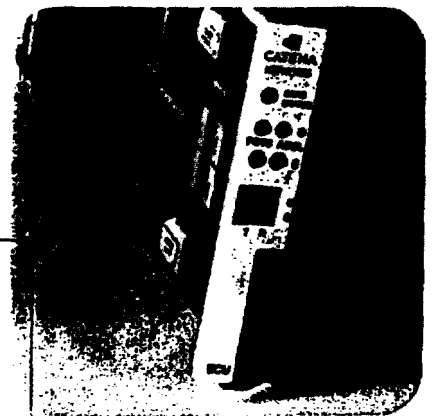
The Enhanced (ATM Mux) Channel Test Unit card performs all multiplexing, ATM and backhaul trunk functions

resources on the SLC Series 5 to communicate between the ECU cards and the ECTU.

This architecture avoids the requirement for any external cabling, whether between cards, or to an external POTS splitter. This greatly simplifies the installation process.

The ECTU provides a local craft configuration interface to manage and configure the DSL system with minimal effort, in addition to the CTU's existing craft interface for testing and configuring special services. LEDs are provided to reflect the status of the system. Once installed in the SLC-5 chassis and connected to backhaul facilities, the ECTU is ready to be provisioned for DSL services from the Network Operations Center.

Ensuring that maximum resources available to a SLC Series 5 are used, the CNX-5 upgrade offers three service options - T1, DSL, and DS-3. These options allow the carrier to get started inexpensively and grow to meet demand as it is required and available.

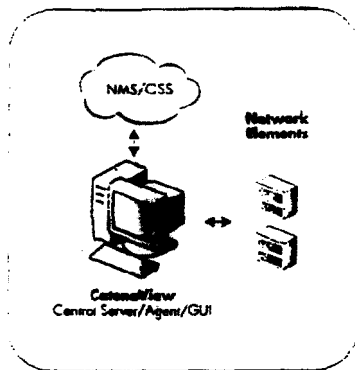


The Enhanced Channel Unit card combines POTS and data line transmission technology.

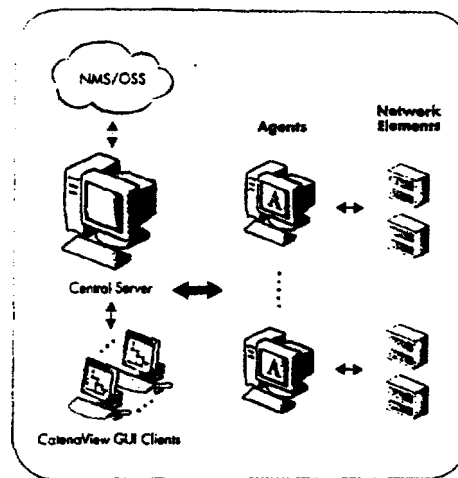
### Catena Enhanced Channel Unit (ECU)

The ECU card uses Catena's industry leading integrated POTS/DSL line interface technology complying with relevant TR-TSY 57 voice, T1.413 and G.992.1 (G.dmt) and G.994.1 (G.handshake) data standards. For voice services, the ECU supports standard POTS functionality. When inserted into the SLC Series 5 chassis, the ECU operates as a standard SLC-5 POTS channel unit. To the service technician, the ECU installs the same way as a standard SLC-5 channel unit with familiar LED displays. For DSL services, the ECU is provisioned the same way as standard DSL services from a DSLAM.

The Catena CNX-5 solution is a simple, elegant and cost-effective way to leverage SLC Series 5 DSL installations to generate new revenue by easily introducing mass market DSL services.



**Initial Roll-out:**  
The CatenaView Central Server, Agent, and Client GUI can reside on the same hardware platform.



**As You Grow:**  
To scale the system, CatenaView Agents can be given control of multiple Catena devices. The Central Server provides the single point of access for OSS, NMS, Windows or Sun clients. Communications between all EMS components use CORBA interfaces.

### CatenaView Element Management System (EMS)

The CNX-5 has been developed with a recognition that when integrating DSL into an existing SLC Series 5, it is important to provide robust tools for provisioning and managing the DSL service, while ensuring that the processes and procedures used to provision and manage the POTS service remain unaffected. Accordingly, POTS provisioning and management on the CNX-5 remains unchanged from the standard SLC Series 5 implementation. All POTS provisioning and trouble-shooting methods are the same for Catena ECUs as for standard channel units in the SLC Series 5.

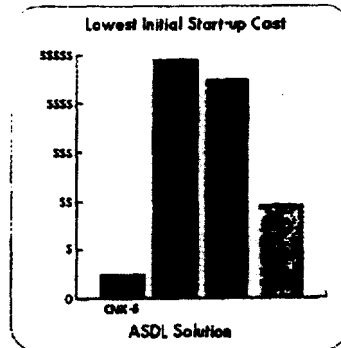
To support the provisioning and management of mass market DSL services, the CNX-5 utilizes Catena Networks' robust CatenaView EMS and complete Application Programming Interface (API) suite. CatenaView is expandable to tens of thousands of lines and can be distributed across client/server platforms for optimum performance and reliability. The full-featured API suite provides the interfaces necessary to electronically link the CNX-5 to upstream Operation Support Systems (OSSs) for flow-through provisioning and reporting.

CatenaView's CORBA API uses a TCP/IP-based protocol to enable natural northbound interoperability regardless of platform, operating system, programming language, network hardware or software. The CatenaView CORBA API facilitates seamless integration into northbound NMS and OSS legacy systems using industry standard technology. By utilizing Catena's CORBA API, service providers are able to achieve true ADSL flow-through provisioning right from the NOC.

## Benefits of the CNX-5 Solution

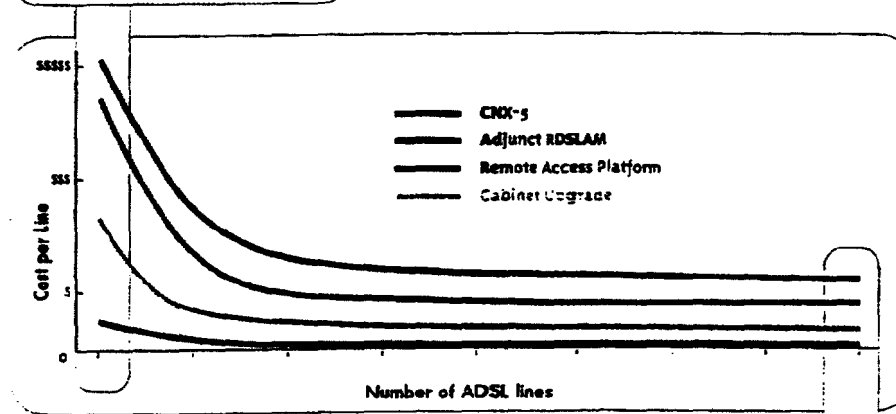
### Simple

The CNX-5 solution is a simple card-for-card replacement for the SLC Series 5 system, comprised of an Enhanced Channel Unit (ECU) card, an ATM Mux Enhanced Channel Test Unit (ECTU) card and the CatenaView EMS. The ECU card provides



### ADSL Per Line Cost Comparison

The CNX-5 provides an attractive cost curve when compared with alternatives.



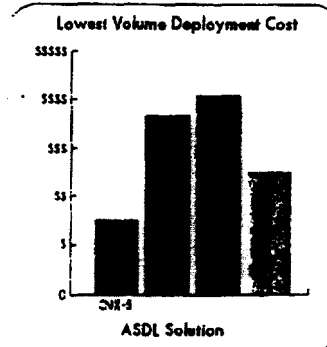
two lines of POTS and two lines of ADSL per card and performs all line functions associated with POTS and ADSL. The ECTU card performs all multiplexing, ATM, and uplink functions, in addition to the existing legacy functions.

### Elegant

Unlike other upgrade solutions, Catena's CNX-5 solution requires no external cabling, no wedging of Mini-RAMs into any available space, and no POTS splitters — just simple, elegant card insertions into the existing chassis. Elegant because an ECTU card replaces the existing Channel Test Unit (CTU) card to make the remote terminal DSL-ready, and because of the scalability that allows growth in accordance with demand through simple CU replacements. Voice services are provisioned in the same way as with legacy SLC CU cards, and data services are provisioned from the Network Operating Center (NOC), consistent with existing DSL service. As a result, there is minimal requirement to retrain technical personnel on the operation of legacy equipment.

### Cost-effective and Scalable

The CNX-5 provides an attractive price curve when compared with alternatives. It is inexpensive to introduce, expands in two-line increments, and achieves densities well beyond alternative solutions. Subtending support linking multi-cabinet sites enables additional flexibility to ensure truly effective WAN utilization. Equally important, the CNX-5 remains less expensive to maintain on a per line basis when compared to other available solutions, and provides significant operations savings when faced with service churn.



## General Solution Specifications

### ATM Support

The CNX-5 supports full ATM capabilities for the most advanced service requirements. Services include all AAL types with full per virtual channel (VC) quality of service (QoS) with overbooking and support for UNI3.0, UNI3.1, and UNI-based SPVC for reduced network operations. Full congestion management includes EPD/PPD. Both sub-channels per DSL line (high latency and low latency) are supported with up to 16 PVCs in any combination of QoS per subscriber line. Full OAM functionality is provided. The system is multicast ready and will migrate to support PNNI, UNI4.0, auto-configuration of ATU-R via ILMI, subchannel services, subscriber side SVC services, and packet services.

### DSL Standards Compliance

- ITU 992.1 (G.dmt)
- ANSI T1.413 Issue 2

### Interoperability

- Fully interoperable with all major ADSL chip sets
- Fully interoperable with Full Rate and G.Lite CPE (ATU-Rs) including popular vendors such as Efficient, 3Com, Westell, Alcatel, and others

### Reliability and Serviceability

- Software and configuration downloads from CatenaView
- Full OAM suite including F5 loopbacks and performance statistics

### Power Requirements

- Derived from -48Vdc in SLC RT

### Robustness

- Easy Recovery — Relevant DSL provisioning data is stored in non-volatile memory to allow for ADSL service recovery from power outages without EMS intervention
- AC Monitor feature — Enables turn-down of DSL service in the event of power outages in order to preserve lifeline POTS battery life

### Operating Environment

- Operating Temperature Range: -40°C to +65°C; -40°F to 150°F
- Storage Temperature Range: -40°C to +65°C; -40°F to 150°F
- Altitude: 4,000 m/12,000 ft
- Relative Humidity: 5% to 90% non-condensing

# ECU

## CNX-5 Enhanced Channel Unit (ECU)

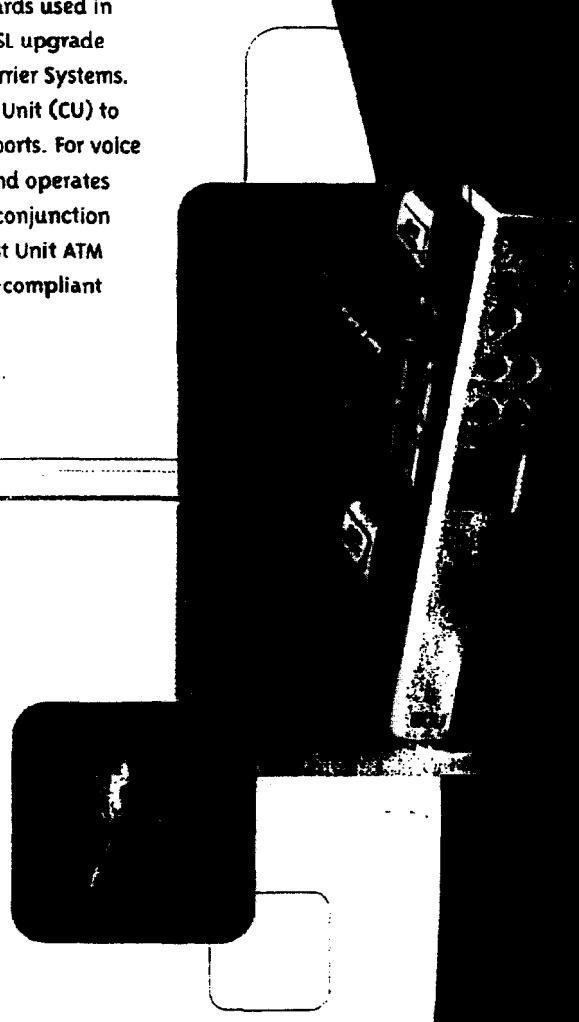
The CNX-5 Enhanced Channel Unit (ECU) is one of two cards used in Catena Networks' simple, elegant and cost-effective ADSL upgrade solution for the installed base of Lucent SLC® Series 5 Carrier Systems. The ECU replaces the existing Lucent dual-POTS Channel Unit (CU) to provide equivalent dual-POTS ports and two new ADSL ports. For voice services the ECU supports standard POTS functionality and operates similarly to the SLC Series 5 channel unit. When used in conjunction with a common CNX-5 Enhanced (ATM Mux) Channel Test Unit ATM fabric card, the ECU will provide two ports of standards-compliant ADSL service, without sacrificing any POTS capacity.

### Highlights

**Simple.** Each simple card-for-card replacement yields full POTS capabilities and provides two new DSL ports. No wiring changes required. No external headend POTS splitters required. Just plug and play.

**Elegant.** POTS service is available upon card insertion. DSL service can be provisioned remotely. No re-wiring or extra cabling. No back plane modifications. No loss in POTS capacity. The legacy SLC Series 5 remote terminal can now elegantly offer DSL service in addition to existing telephony services.

**Cost-effective.** The Catena Networks CNX-5 DSL Upgrade System enables lower start-up costs, lower expansion costs, and lower inventory costs compared to alternatives such as Mini-RAMs, and remote DSLAMs.



# ECTU

## CNX-5 Enhanced (ATM Mux) Channel Test Unit (ECTU)

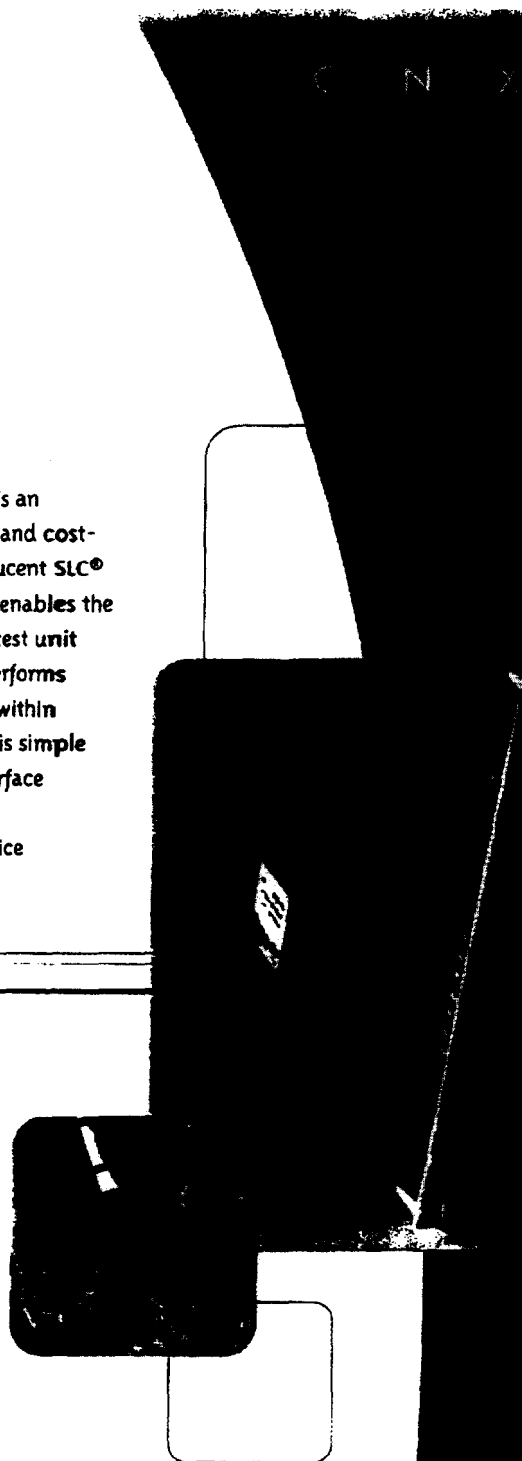
The CNX-5 Enhanced (ATM Mux) Channel Test Unit (ECTU) is an ATM fabric card used in Catena Networks' simple, elegant and cost-effective ADSL upgrade solution for the installed base of Lucent SLC® Series 5 Carrier Systems. The ECTU card, which broadband enables the SLC Series 5, is a replacement card for the legacy channel test unit (CTU). The ECTU provides the ATM switching fabric and performs traffic management and ATM network interface functions within the unit while preserving the legacy CTU test functions. This simple integrated approach, combined with flexible network interface options, makes Catena Networks' CNX-5 upgrade the most cost-effective and scalable solution for providing DSL service to subscribers served from SLC Series 5 remote terminals.

### Highlights

**Simple. ADSL Upgrade** — The legacy channel test unit is simply exchanged for the Catena Enhanced (ATM Mux) Channel Test Unit (ECTU) card which performs muxing, ATM traffic management and network interface functions while broadband enabling all channel unit slots within the SLC Series 5.

**Elegant.** The ECTU provides a full featured ATM multiplexer within a compact footprint. Carrier class performance is assured with advanced ATM service support, sophisticated traffic management capabilities and large buffering to meet a wide range of service requirements. Services include all AAL types with full per VC QoS (CBR, VBR-rt, VBR-nrt, UBR+, UBR, GFR) with overbooking and support for UNI3.0, UNI3.1, UNI 4.0 as well as UNI based SPVC for reduced network operations.

**Cost-Effective & Scalable.** The CNX-5 offers a variety of network interfaces to maximize a carrier's WAN options and flexibility including T1, 4xT1, or DS-3 interfaces. T1/IMA based options provide flexibility in maximizing existing transport gear and facilities. DS-3 level network interfaces support higher fill rates while maintaining quality of service (QoS). Subtending support enables additional flexibility (i.e. meeting the needs of multi-tenant sites) to ensure truly effective WAN utilization.



## Catena CNX-5 Upgrade to SLC® Series 5 Remote

### Specifications

#### Network Interfaces

- ATM 4 port DS-1/IMA
  - Supports mix of DS-1 UNI & 1-2 IMA groups.
  - Inverse Multiplexing for ATM : IMA v1.1
- ATM DS-3 port

#### ATM Functionality

- UNI3.0/3.1; UNI based SPVC for reduced network operations
- The system is multicast ready and will migrate to support UNI4.0, PNNI, PNNI SPVC, ILMI auto-configuration of the ATU-R, subtending, subscriber side SVC, and packet services
- Classes of service supported include CBR, VBR-rt, VBR-nrt, UBR\*, UBR and GFR
- 16 PVC with any combination of QoS per subscriber line
- Network uplink overbooking and traffic shaping
- VC shaping is provided towards the subscriber lines. VC shaping is provided for multiple network-side VP services across the network link. Guaranteed bandwidths can be offered for delay sensitive applications
- System features large buffers with multiple congestion thresholds and EPD/PPD. Full multi-grained congestion management includes EPD/PPD and multiple watermarks
- Multi-protocol encapsulation over ATM (RFC 1483 & RFC 2684). Support for the following models: PPP over Ethernet (RFC2516), PPP over ATM (RFC2364) and Classical IP (RFC1577)
- Comprehensive ATM OAM (1.6io FM & PM) and ATM / DSL MIBs

#### Robustness

- Easy Recovery — Relevant DSL provisioning data is stored in nonvolatile memory to allow for ADSL service recovery from power outages without EMS intervention
- AC Monitor feature — Enables turn-down of DSL service in the event of power outages in order to preserve lifeline POTS battery life

#### Legacy Test Functions

- Support for existing channel test unit functionality including remote test access, diagnostics and configuration of special service channel units

#### Physical Dimensions

- Height: 7.5 inches; 19 cm
- Width: 0.65 inches; 1.5 cm
- Depth: 10 inches; 25 cm
- Weight: 0.8 lbs; 350 g

#### Management Interfaces

- Craft Interface via RS-232 or 10BaseT Ethernet.
- Comprehensive EMS with CORBA, GUI, CLUI, Telnet, FTP & SNMP (v1, v2c, v3)

#### Power Requirements

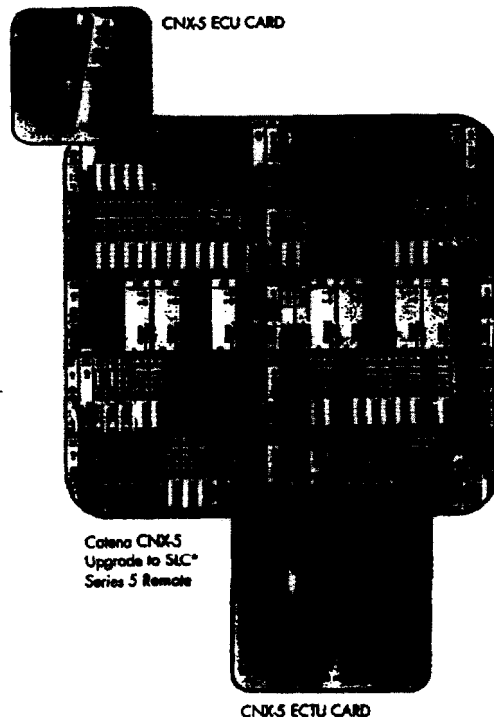
- Derived from -48Vdc in SLC RT

#### Operating Environment

- Operating Temperature Range: -40°C to +65°C; -40°F to 150°F
- Storage Temperature Range: -40°C to +65°C; -40°F to 150°F
- Altitude: 4,000 m/12,000 ft
- Relative Humidity: 5% to 90% non-condensing

#### Environmental & Safety Compliance

Telcordia GR-1089, UL1950, CSA 22.2



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**CATENA**  
NETWORKS

## Catena CNX-5 Upgrade to SLC® Series 5 Remote

### Features

- 2 POTS ports + 2 DSL ports in a single SLC-5 Channel Unit form factor

### ADSL

- Fully interoperable with Full Rate and G.Lite CPE (ATU-Rs) including popular vendors such as Efficient, 3Com, Westell, Alcatel, and others
- ITU G.992.1 (G.dmt)/ T1.413 (ADSL) compliant

### Telephony

- Meets relevant TR-TSY-000057 voice requirements
- Compatible with voiceband modem transmission, including v.90
- Automatic loss equalization and balance selection to support loops to 1400 ohms
- Supports both dial pulsing and DTMF
- Compatible with CLASS services
- Supports fast forward disconnect

### Specifications

#### Robustness

- Automatic over-voltage protection
- Robust front end compliant with relevant Telcordia GR-1089 requirements

#### Physical Dimensions

- Height: 3.5 inches; 8.5 cm
- Width: 0.65 inches; 1.5 cm
- Depth: 10 inches; 25 cm
- Weight: 0.6 lbs; 250 g

#### Maintenance Interfaces

- Faceplate test access to tip and ring for both channels
- Line and card status LEDs
- Compatible with Metallic Loop Testing (MLT), Pair Gain Test Controller (PGTC) and Extended Test Controller (XTC) test systems

### Power Requirements

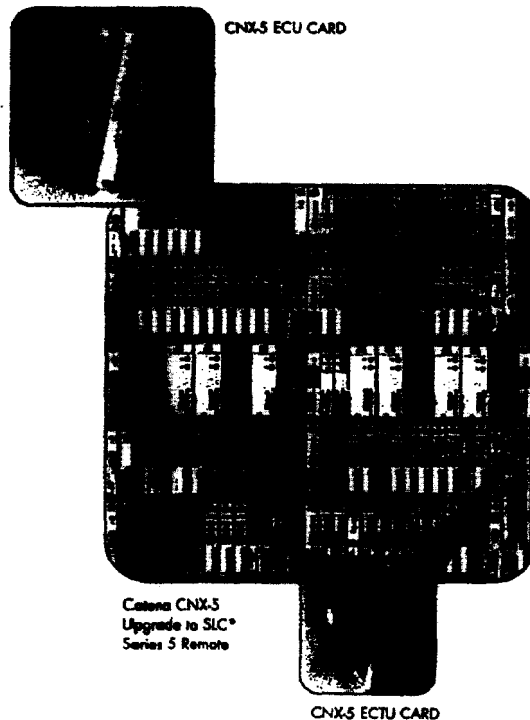
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### Operating Environment

- Operating Temperature Range: -40°C to 65°C; -40°F to 150°F
- Storage Temperature Range: -40°C to 65°C; -40°F to 150°F
- Altitude: 4,000 m/12,000 ft
- Relative Humidity: 5% to 90% non-condensing

### Environmental & Safety Compliance

- Compliance: UL 1950 & CSA 22.2





**Bob Machlin, President and CEO**

